

FIG. 1

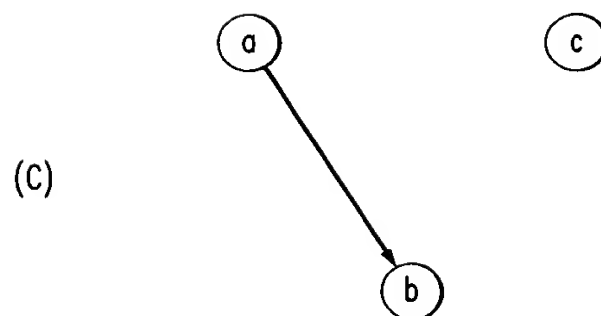
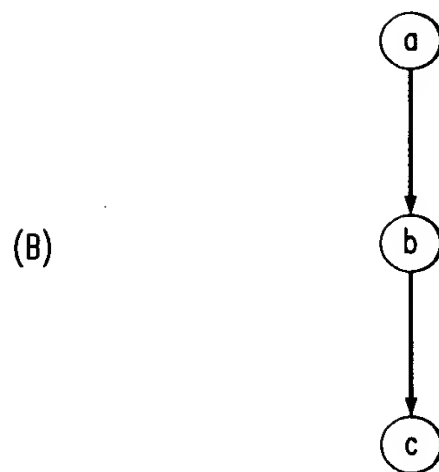
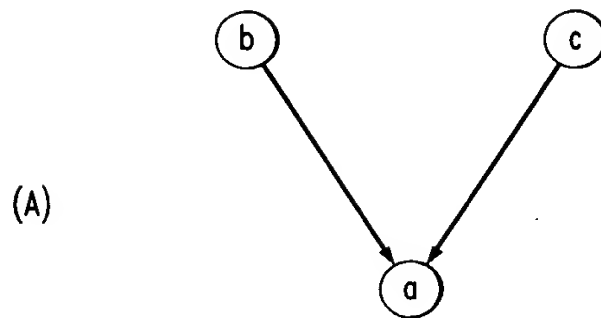


FIG. 2A

T_1:	{a, b, c, d, e, f, g}
T_2:	{d, f, g}
T_3:	{a, b, d, g}
T_4:	{a, d, g}
T_5:	{f, g}
T_6:	{e, f}
T_7:	{e}
T_8:	{h, i}
T_9:	{h, j}
T_10:	{j}

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PATTERNS	COUNT
a b	2
a d	3
a e	1
a f	1
a g	3
:	:

106

PATTERNS	COUNT
a	3
b	2
c	1
d	4
e	3
f	4
g	5
h	2
i	1
j	2

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EXAMPLE FOR DEPENDENCY

{ag}: FREQUENT, IS NOT d-PATTERN WITH 95% CONFIDENCE

$p(a) = 3/10$; $p(g) = 5/10$; $p^* = 3/10 * 5/10 = 0.15$

$\text{minsup}(\{a,g\}) = 10 * 0.15 + 1.86 * \text{sqrt}(10 * 0.15 * (1-0.15))$
 $= 3.6$

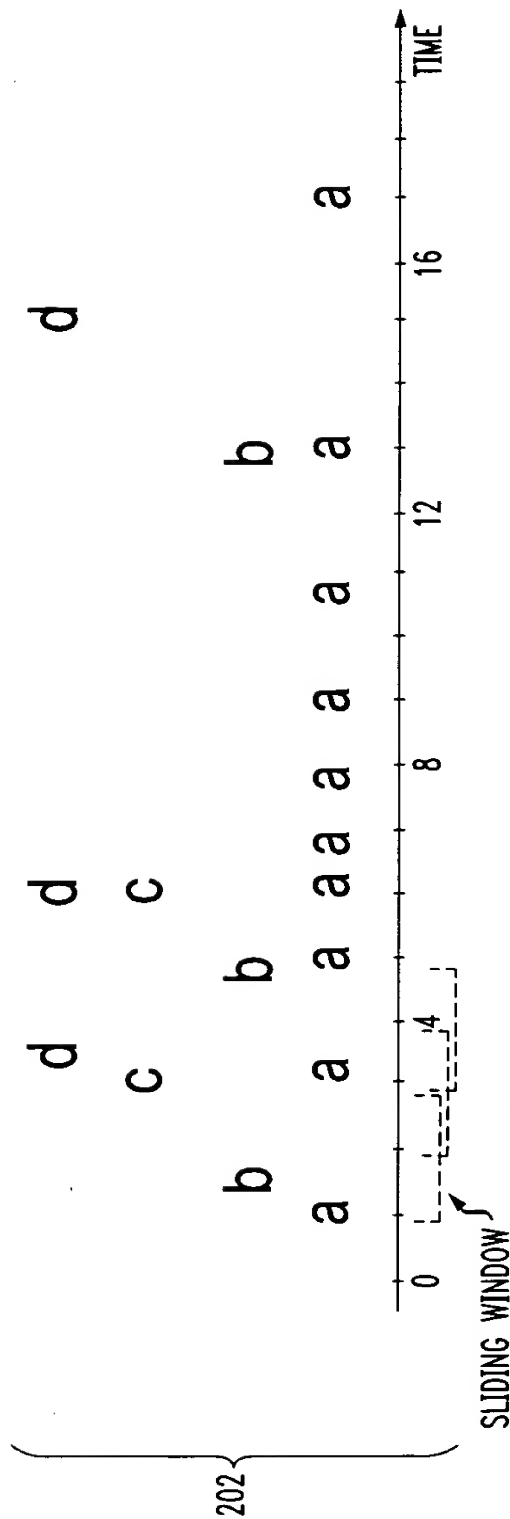
{ab}: IS NOT FREQUENT, BUT IS d-PATTERN WITH 95% CONFIDENCE

$p(a) = 3/10$, $p(b) = 2/10$, $p^* = 2/10 * 3/10 = 0.06$

$\text{minsup}(\{a,b\}) = 10 * 0.06 + 1.86 * \text{sqrt}(10 * 0.06 * (1-0.06))$
 $= 1.99$

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FIG. 2B



204

PATTERNS	COUNT
a	10
b	3
c	2
d	3

206

PATTERNS	COUNT
a b	3
a c	2
d c	2
:	:

208

EXAMPLE FOR DEPENDENCY

TOTAL NUMBER OF SLIDING WINDOWS = 20

{a,b}: FREQUENT, BUT NOT d-PATTERN WITH 95% CONFIDENCE

$p(a) = 10/20$; $p(b) = 3/20$; $p^* = 10/20 * 3/20 = 0.075$

$\text{minsup}(\{a,b\}) = 20 * 0.075 + 1.86 * \text{sqrt}(20 * 0.075 * (1 - 0.075)) = 3.69$

{d,c}: NOT FREQUENT, BUT IS d-PATTERN WITH 95% CONFIDENCE

$p(d) = 3/20$; $p(c) = 2/20$; $p^* = 3/20 * 2/20 = 0.015$

$\text{minsup}(\{d,c\}) = 20 * 0.015 + 1.86 * \text{sqrt}(20 * 0.015 * (1 - 0.015)) = 1.3$

FIG. 3

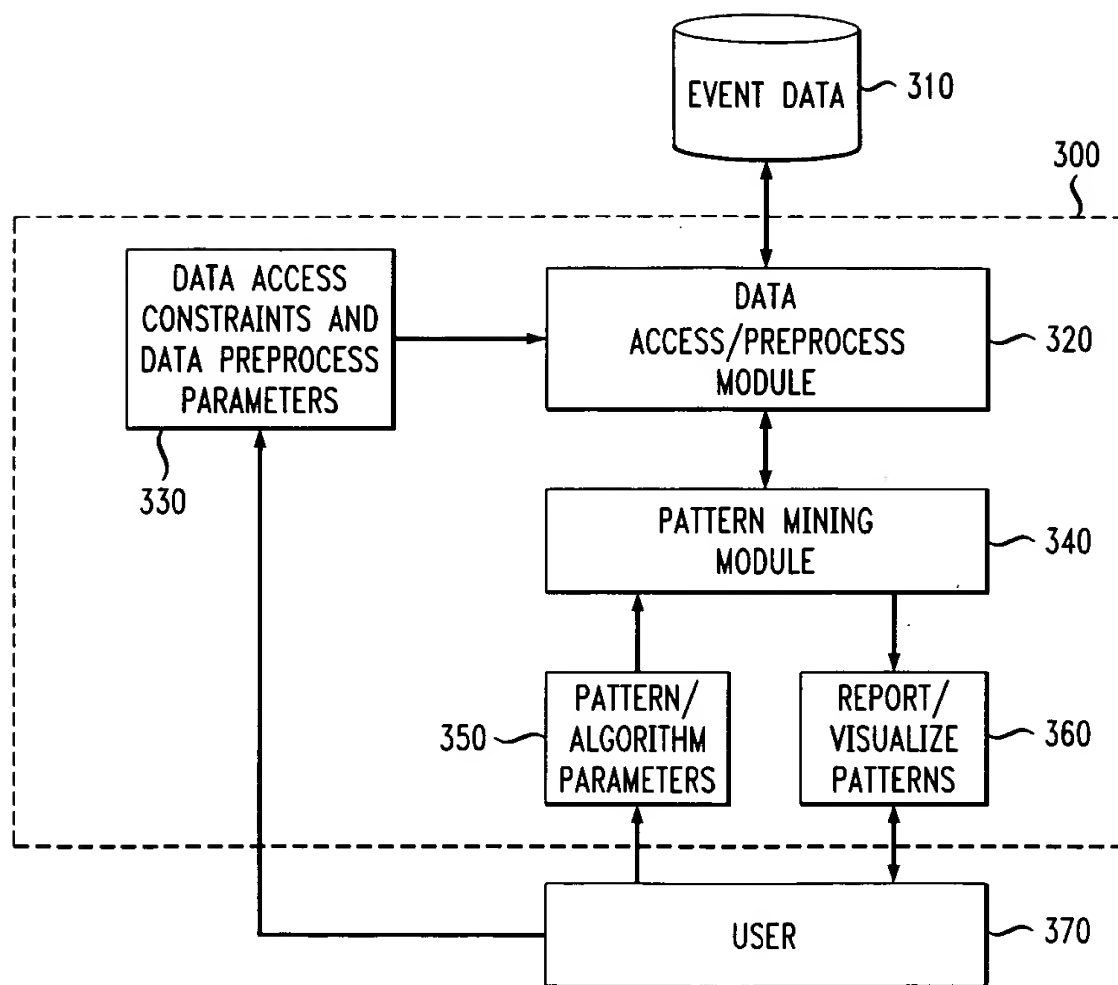


FIG. 4

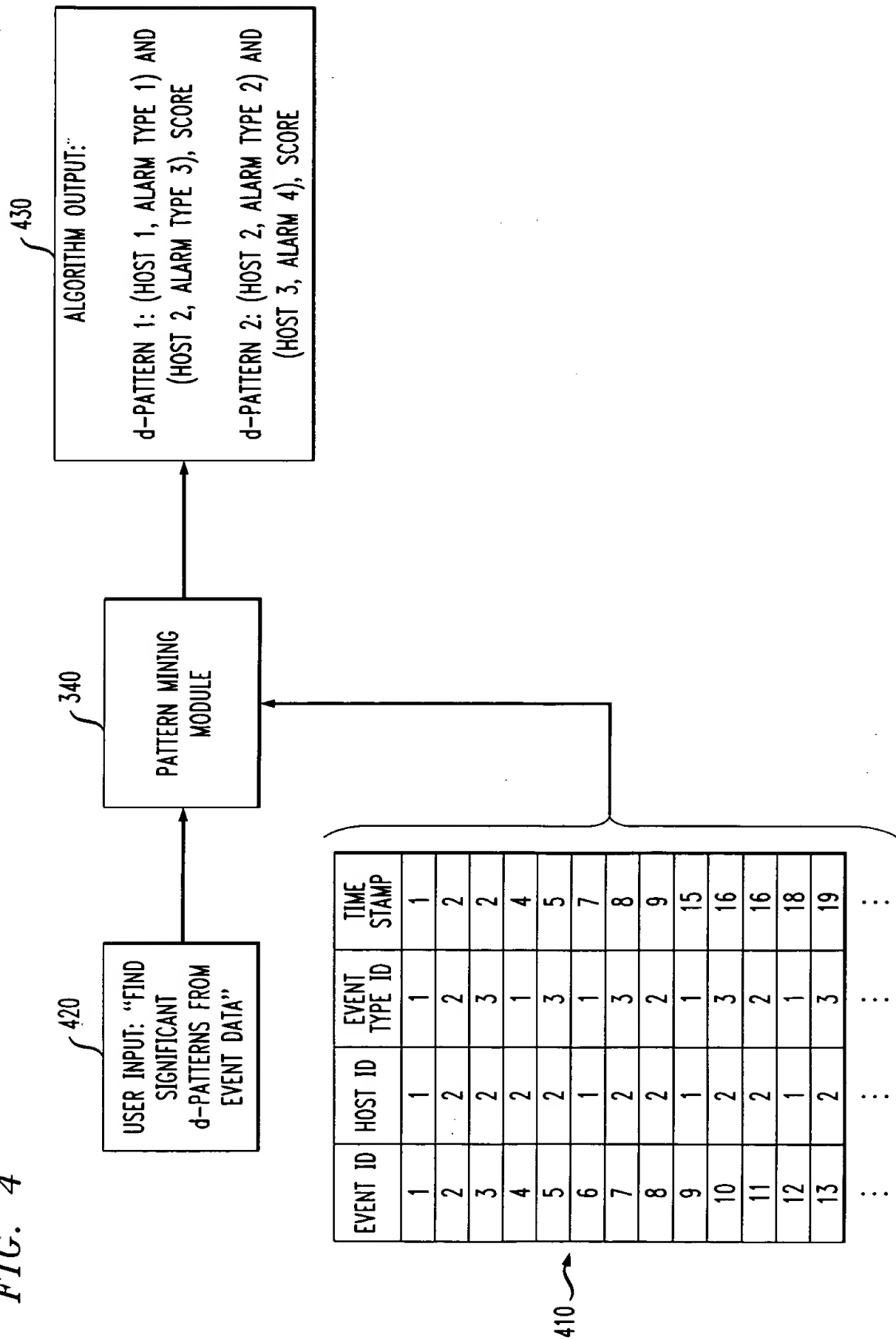


FIG. 5

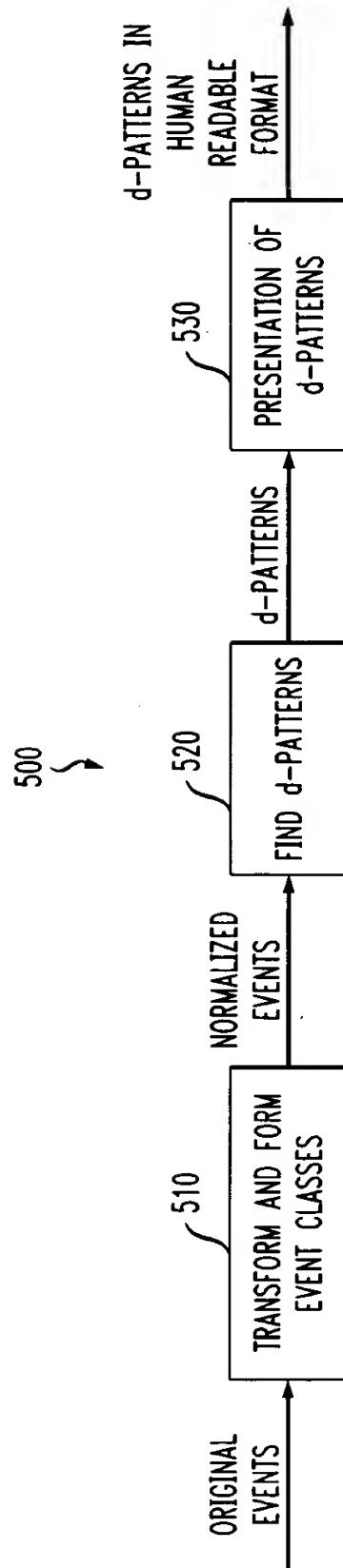
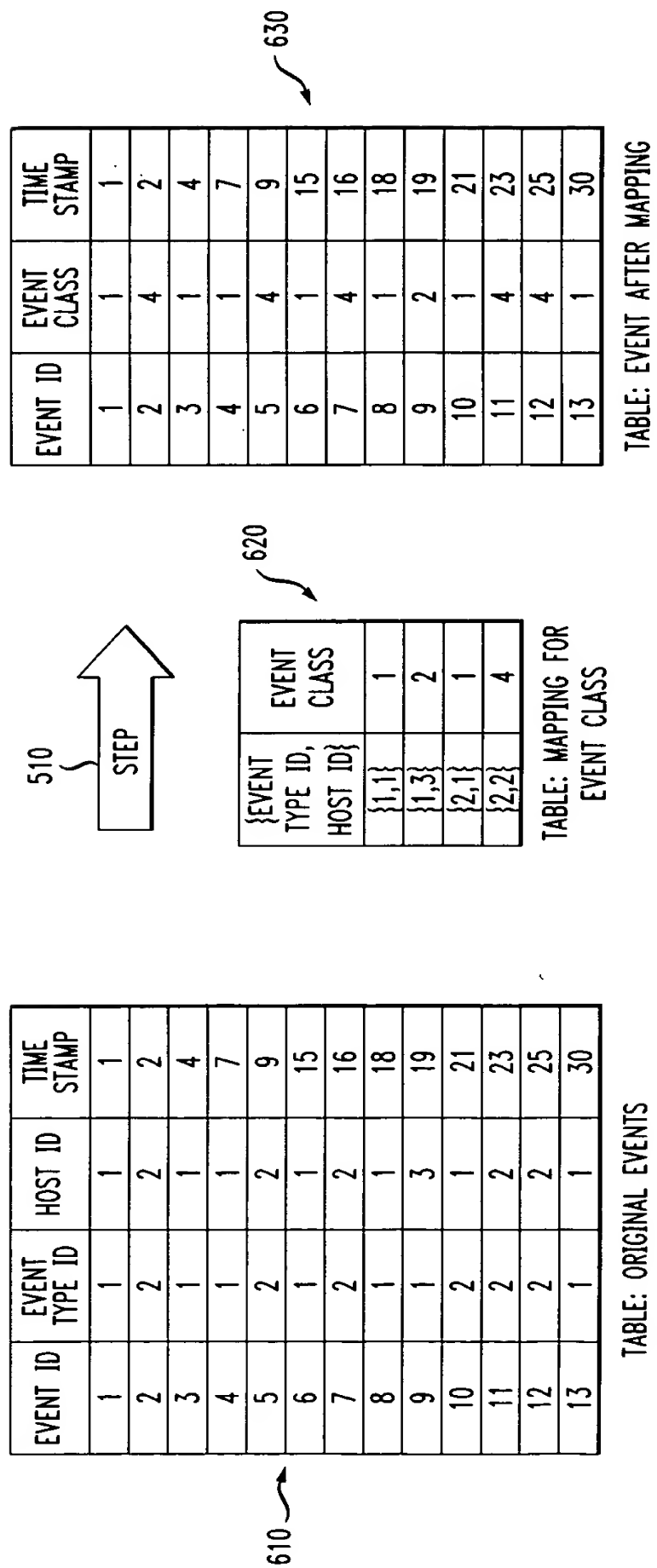


FIG. 6



EVENT ID	EVENT TYPE ID	HOST ID	TIME STAMP
1	1	1	1
2	2	2	2
3	1	1	4
4	1	1	7
5	2	2	9
6	1	1	15
7	2	2	16
8	1	1	18
9	1	3	19
10	2	1	21
11	2	2	23
12	2	2	25
13	1	1	30

TABLE: ORIGINAL EVENTS

{EVENT TYPE ID, HOST ID}	EVENT CLASS
{1,1}	1
{1,3}	2
{2,1}	1
{2,2}	4

TABLE: MAPPING FOR EVENT CLASS

EVENT ID	EVENT CLASS	TIME STAMP
1	1	1
2	4	2
3	1	4
4	1	7
5	4	9
6	1	15
7	4	16
8	1	18
9	2	19
10	1	21
11	4	23
12	4	25
13	1	30

TABLE: EVENT AFTER MAPPING

FIG. 7

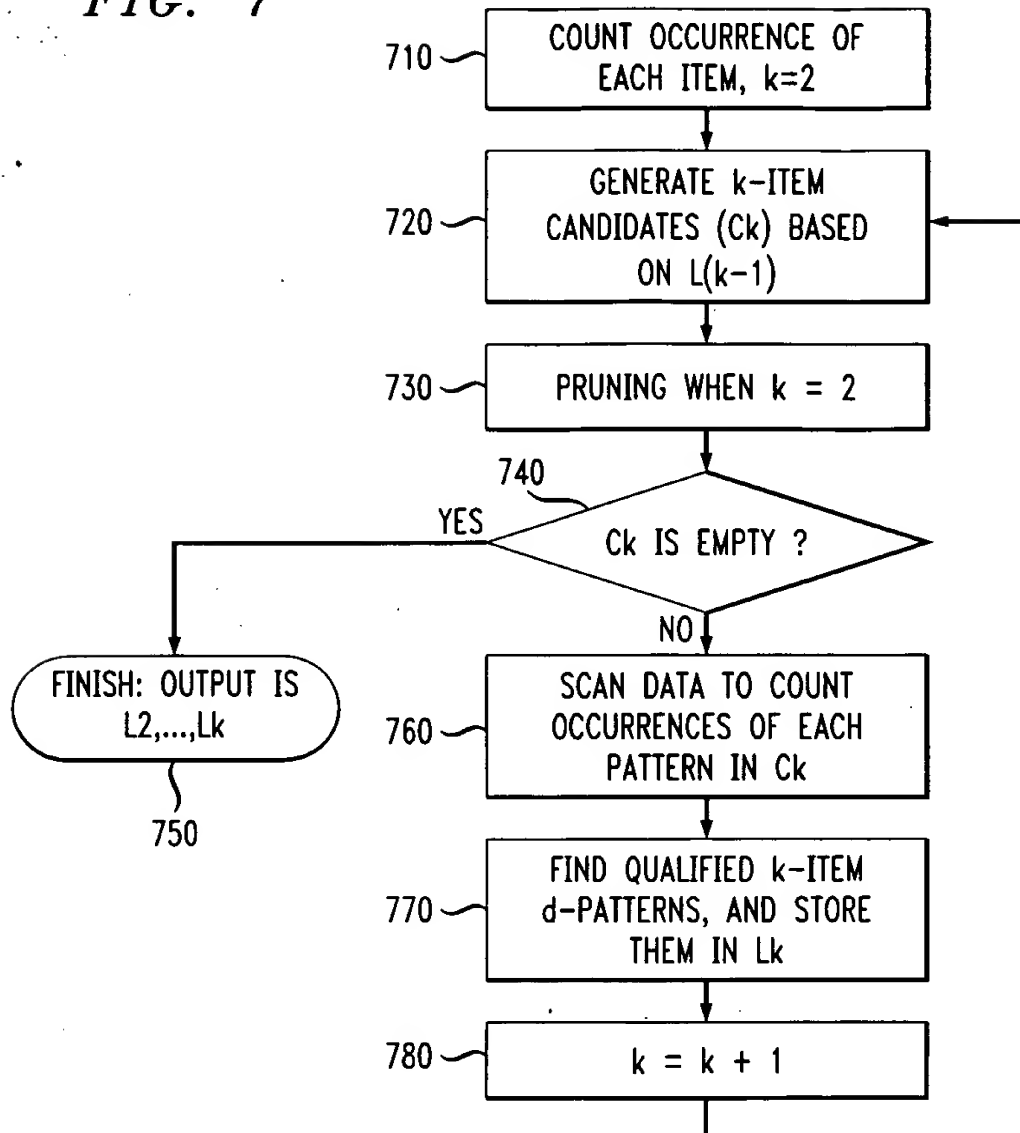


FIG. 8

